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Contact Angle Dependence of Viscosity for Micro-Scale Flows DEBJYOTI BANERJEE[1], STEPHEN GAUNTT, Texas A&M University, MECHANICAL ENGINEERING DEPARTMENT TEAM — Several microchambers with different geometries and surface properties were microfabricated. Experiments were performed to fill the microchambers with different liquids (e.g., water and alcohol) at various flow rates to study the conditions for bubble formation inside the microchambers. The results indicate that contact angle plays a significant role on properties of fluids confined within small geometries, such as in microfluidic devices. On treatment of the glass with a mono-layer of Octa Tri-Chloro Silane the hydrophobic surface is formed. In the presence of the hydrophobic surface the flow characteristics for filling of the micro-chamber change drastically. On fitting a numerical model to the experimental data it is observed that the viscosity in the fluid confined close to the wall ("near wall region") can decrease by a factor of 10-100 on treatment with OTS. This shows that the viscosity in confined fluids can depend on the contact angle.

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